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Personal Factors Associated with Sickness Absence[1]

A Study of 194 Men with Contrasting Sickness Absence Experience in a Refinery Population

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Men with different patterns of sickness absence behaviour have been identified from a refinery population by simple epidemiological techniques. A detailed clinical study is described of four groups: 56 men with five or more sickness spells in 1964 and a matched control of 56 men; 35 men who had 60 or more days of sickness absence in 1964; and finally 47 men who had not had one day off sick for at least eight years.

Whereas the men who were frequently sick tended to be younger and mostly on day work, those with long periods of sickness were reasonably representative of the whole population, and the men without any sickness absence were older and mostly on shift work. An analysis of records both before and since 1964 showed that the groups had maintained a consistent pattern of sickness absence, but when individuals were considered their behaviour was less consistent. Nevertheless there appeared to be states of sickness absence 'liability' and also 'resistance' which persisted for a variable length of time from a year or two up to many years.

The pre-employment medical examination proved in retrospect to have been of little predictive value. Absenteeism, lateness, and also occupational injuries were all strongly associated with sickness spells, although the level of overtime was not. Previous episodes of neurotic illness, peptic ulceration, and loss of work due to back pain were also associated with frequent sickness spells, so also were frequent colds and troublesome constipation. An unexpected finding from the physical examination was that over one quarter of those who were never sick had some organic disease.

Although neither the social nor economic circumstances differed between the groups, the attitude of the men towards themselves and their work proved to be of major importance. A memory of an unhappy childhood was more common in both groups with a lot of sickness absence, whilst dislike of the job or frustrated ambition was common in men with frequent spells. Those who were never sick denied all such problems as they denied illness. Personality testing revealed that extroversion was more marked in the frequently sick group, neuroticism in the long sick, and introversion in the never sick.

The validity and significance of the results are discussed and suggestions are made for further investigation.

Absence from work due to illness or injury can not only produce difficulty and sometimes hardship for the sick person and his family but it also brings problems and expense to the employer. Furthermore, there is a serious effect on the national economy since well over one million people are absent from work each day in Great Britain due to certified incapacity, and the annual cost to the Exchequer alone is well over £200 million. Morris (1965) has shown that sickness absence has increased dramatically in this country since World War II, and Enterline (1964) indicated that this is a problem which affects particularly the countries of Western Europe.

The degree of attention paid to sickness absence has usually depended upon economic conditions, being greater when labour is scarce, as in wartime, or costly, as it is today. Most published reports on sickness absence have been concerned with methods of measurement and the effects of age, job, civil

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status, and sick pay schemes on absence rates. There have been few studies designed to measure the importance of personal factors, although this formed the basis of extensive studies in relation to accidents by the Industrial Health Research Board (Farmer and Chambers, 1929) and others such as Smiley (1955) and Cresswell and Froggatt (1963).

In recent years evidence has been presented (Sutherland and Whitwell, 1948; Hinkle and Plummer, 1952; Taylor, 1967a) that the pattern of sickness absence within members of an industrial population resembles that of an unequal chance distribution (negative binomial) rather than one of random distribution (Poisson). In this respect sickness absence resembles occupational accidents for which this pattern was first described by Greenwood and Woods (1919).

The ability to identify, by epidemiological techniques, groups of workers with extremes of sickness absence behaviour led to the present study which describes an investigation designed to provide answers to the following questions:

1. Will a detailed examination of individual men who have widely contrasting sickness absence records reveal other significant differences between them?
2. If such differences exist, are they medical, social, occupational or economic, and are any of them likely to be important causes of sickness absence?

Material and Selection of Groups for Study

A major problem in any study of sickness absence is the considerable effect imposed by variables such as age, sex, occupation, status, sick pay arrangements, and the like. For this reason, a brief outline of some of the more relevant characteristics of the refinery population will be included before describing the criteria used to identify the groups of men and the methods by which they were studied.

Some Characteristics of the Refinery Population The refinery, situated in a semi-rural area in south-east England, operates a continuous process production system. The reference year in this investigation was 1964, and the number of employees on the payroll at the end of that year was 2,076. Of these, 95 were female, 598 were male staff on an annual salary, and 1,383 were hourly paid men. Since the investigation was concerned only with the last group of men, no further reference will be made to females or to staff. The industry is relatively prosperous and has developed considerably in the last 20 years. Almost half of the men are employed on three-cycle, continuous shift work; the remainder are on a five-day week. The working week has been 40 hours since 1962, and overtime among the men averaged five hours per week in 1964. All men retire at the age of 60, and the mean age of the population at the end of 1964 was 40·0 years. An 'ex gratia' sick-pay scheme introduced in 1946 provides for payment of full wages to all employees with over six months' service from the first day of absence. The duration of payment varies with the length of service from an initial three weeks at full pay followed by two weeks at half pay increasing to 27 weeks at full pay and 24 weeks at half pay after 15 years' service. Chronic sick are kept on until they are fit to resume some sort of work or reach a pensionable age. Single-day sickness absences are eligible for sick pay, and at the time of the survey all sickness absences had to be covered by medical certificates.

Medical Services and Records A medical department provides 24-hour cover with orderlies on shift as well as a full-time doctor and qualified nursing staff on day work. A sickness absence record card is maintained for every employee upon which details of all absences attributed to illness or injury are recorded. These details include the dates of commencement and return, the duration of each spell in calendar days, and the diagnosis. All employees absent for two weeks or more are seen by the doctor when they return to work. These records have been scrupulously maintained and are checked against the wages returns for accuracy.

Selection of Men for the Survey There are two main measures of sickness absence—the number of spells experienced in a period (frequency), and the number of days of absence in a period (severity).

The personal sickness absence record cards of all hourly paid men employed throughout 1964 were inspected as soon as the records for the year were complete. The number and duration of the spells in that year are shown in Table I.

TABLE I

TOTAL NUMBER OF SPELLS OF SICKNESS ABSENCE AND THE TOTAL DURATION IN CALENDAR DAYS AMONG ALL 1,350 MEN EMPLOYED THROUGHOUT 1964

	Spells	*Days*
Total recorded	1,651	17,490
Mean per man	1·22	12·96
Range	0-11	0-245
Standard deviation	1·46	20·81

Two of the groups for the survey were selected from this information, 'frequently sick' being men who had five or more spells of absence in the year, and 'long sick' men who had 60 or more calendar days of absence in the year. These levels were chosen because they were the nearest suitable numbers above the sum of the means and twice the standard deviations, and they also provided a convenient number of men for study.

The other extreme of sickness absence which it was decided to investigate was a negative one, in other words, men who did not have any sickness absence. Since more than one man in three had no such spell in 1964,

the personal record cards were inspected to find out how many men had had no sickness absence for several years and the results are shown in Table II.

TABLE II

NUMBER AND PROPORTIONS OF HOURLY PAID MEN HAVING NO SICKNESS ABSENCE FOR UP TO 15 YEARS' CONTINUOUS EMPLOYMENT UNTIL 1964

Calendar Years	*No. of Years at Risk*	*No. of Men at Risk*	*No. without Sickness Absence*	*Never Sick* (%)
1964 only	1	1,350	531	39·4
1963–64	2	1,294	294	22·7
1962–64	3	1,236	182	14·7
1961–64	4	1,162	133	11·5
1960–64	5	1,094	102	9·3
1959–64	6	985	74	7·5
1958–64	7	868	64	7·4
1957–64	8	721	50	6·9
1956–64	9	696	42	6·0
1955–64	10	623	31	5·0
1954–64	11	604	26	4·3
1953–64	12	566	18	3·2
1952–64	13	523	15	2·9
1951–64	14	450	12	2·7
1950–64	15	371	11	3·0

It was decided that the 'never sick' group should consist of all the 50 men who had not been away sick for a minimum of eight years (1957-64). This period was chosen to obtain a large enough number of men for the clinical study.

Finally a control group was selected. Ideally, this should have been a large and representative cross-section of all the men. Unfortunately, since the three groups already selected included 147 men, it was not possible to have a control group of similar or larger size as the time available for the survey was limited and it was also considered important to see all the men as soon as possible after the end of 1964, since any short-term factors affecting absence would be more likely to be operative or fresh in the memory.

Controls were therefore selected for each man in the frequently sick group. Their names were obtained from the nominal roll of all employees after excluding the 147 men already identified, and were matched within (*a*) identical occupation and department; (*b*) similar length of service, to less than two years; and (*c*) similar age, to less than three years. Where more than one man provided an equal match the one whose name came nearest in alphabetical order was selected.

Size of Groups and Reasons for Exclusion from the Survey The total number of men selected for this survey was 207. Thirteen were not seen and the reasons for their exclusion are described below. The numbers of men seen in each group were as follows:

Frequently Sick Sixty men were identified but four of them left the Company early in 1965 before they could be contacted. This left 56 men, all of whom were seen.

Controls Since the men were individually matched, the four men paired with those who had left in the first group were not seen (one of them had also left the Company). All the remaining 56 men were seen.

Long Sick Of the 37 men originally identified, one with motor neurone disease never returned to work and died in December 1965, and one man refused to take part in the survey. Thus 35 men were seen.

Never Sick Three men out of the 50 identified (Table II) refused to take part in the survey and thus 47 men were seen.

A refusal rate of four out of the 198 men invited to take part in the survey represents just over 2% and is not sufficiently large to invalidate the results. The fact that three of them came from the never sick group may well be significant in the light of some of the observations made on this group which will be discussed later.

Methods

Management agreed to allow the survey, and consultation with senior shop stewards produced assurances of their full support. A questionnaire was designed and modified by a trial on 12 staff employees.

Each man was approached individually by the author and invited to help in the survey. It was explained that any information obtained would be treated in confidence and would not be included in his ordinary medical notes, and that no action which could affect his career would be taken unless he requested it. Each interview took about one hour.

The questionnaire was not changed at all throughout the survey and, to minimize the effect of alteration in observer bias, men from the four groups were seen in rotation. They could be seen only during their working hours; this and the fact that many were on shift work made a predetermined random order impossible.

The information collected about each man came partly from documents and records but mostly from the interview and examination; it can be summarized under the following headings: personnel records; medical records; occupational history and factors related to the job; social background and present home circumstances; family and personal past medical history; present symptoms; physical examination and special investigations; and, supervisor's work performance rating.

The questions about present symptoms included those of the M.R.C. Short Questionnaire on Respiratory Symptoms (1960). The physical examination was standardized as far as possible to provide measurable information on function. Special investigations were limited to tests simple to perform and acceptable to the men. For the latter reason routine blood samples were not taken. Urine was tested for protein and glucose, respiratory function was measured by the Vitalograph

direct spirometer, and a standard chest radiograph was taken. It was decided to use some form of personality test and, after consideration of those in current use, the new Eysenck Personality Inventory was chosen. This consists of two question papers and is designed to measure extroversion and neuroticism.

The supervisors' ratings of work performance were obtained after all the men had been seen and were requested verbally and in confidence. They were asked to rate their men on working performance and ability on a four-point scale: exceptional, above average, average, and below average. Such ratings are open to criticism, but it was felt that some indication of work performance should be included in the analysis.

Results

A large amount of information was collected during this survey and over 200 facts about each man were examined, separately or in combination, for their association with sickness absence. Inevitably many of them showed no real difference between the groups, but a few of these negative observations are of interest and will be mentioned in this section. Factors which were found to be associated with sickness absence will be described in more detail.

Statistical comparisons are difficult to make in this sort of survey since, by definition, the groups are not representative samples of the whole population from which they were selected. Most of the information collected is also not available for the whole population. Furthermore, it has been shown (Taylor, 1967a) that indices such as sickness absence and lateness as well as occupational injuries are distributed in a negative binomial manner so that, with the numbers involved in this study and without elaborate correction factors, distribution free tests must be used. For much of the data, therefore, the only valid means of comparison is the use of a relative rate having the characteristic of a proportion.

Personnel Records

Age and Occupation Although a wide age range was found in each group, the frequently sick tended to be younger whilst the long and never sick were older, but for the latter group this was partly due to the method of selection which required a minimum of eight years' continuous service. Shift workers were rare among the frequently sick, common among the never sick, and made up almost half of the long sick group. As in all factories, workers can be divided into three main functional groups—production, maintenance, and service. The frequently sick were mostly from the maintenance group whereas the never sick were mostly production workers. These findings are presented in Table III. The control group had by their selection the same age and occupational structure as the frequently sick group.

TABLE III

AGES AND OCCUPATIONS OF THE THREE MAIN GROUPS AND OF THE WHOLE POPULATION FOR 1964

	Frequently Sick	*Long Sick*	*Never Sick*	*All Hourly Paid Men*
No. of men	56	35	47	1,350
Mean age (yrs)	32·8	45·4	48·1	40·0
Age range (yrs)	17–55	20–59	25–59	16–59
Production (%)	18	37	62	42
Maintenance (%)	73	29	13	40
Services (%)	9	34	25	18
Shift work (%)	9	49	72	49

The number of promotions achieved by each man in his first three years of company service was noted and the means for the groups showed no significant difference.

Overtime The total hours of overtime worked by each man in 1964 were divided by the number of weeks he actually worked, thus allowing for absence on holiday and sickness. Each group showed a wide range; some men had done none, some a good deal. The mean figure for the whole population in 1964 was 7·6 hours per worked week, and that for each group was:

Frequently sick	11·4 hours (range 0-23·4)
Controls	11·0 hours (range 0-24·4)
Long sick	7·2 hours (range 0-23·5)
Never sick	5·2 hours (range 0-18·1)

One important reason for this difference between the groups is that overtime in the daywork maintenance force is always higher than in shift production and service workers. There was no correlation between sickness spells and overtime because a few men with high rates did no overtime and others with no sickness spells did a lot. For instance, the man in the control group who had worked an average 64·4-hour week in 1964 had no sickness absence that year. This problem will be referred to again below.

Lateness and Absenteeism Positive correlations were found between sickness spells and lateness in 'clocking on' to work ($r = +0{\cdot}4$), and also with episodes of absence with or without permission for reasons other than sickness, holidays or union

meetings ($r = +0.5$). Since all these indices are distributed in a negative binomial pattern, standard errors and the usual tests of significance cannot be applied.

However, a comparison of the proportions of men with more than four episodes of lateness and also those with over four other absences in 1964 (Table IV) allows the use of a statistical test. These levels were chosen as they were the nearest whole number above the mean lateness and other absence episodes for the whole population.

TABLE IV

MEN IN EACH GROUP WITH MORE THAN FOUR EPISODES OF LATENESS AND ABSENTEEISM IN 1964

Group	Lateness		Absenteeism	
	No.	%	No.	%
Frequently sick	31	55	27	48
Controls	18	32	13	23
Long sick	5	14	12	34
Never sick	0	0	1	2
All men	54	28	53	27

The differences between the proportions of the frequently sick and controls are significant ($P<0.05$) for both measures, as are those between the long and never sick groups. With these as well as with sickness spells, the frequently sick and never sick groups are clearly at opposite ends of a spectrum.

Medical Records The scope and nature of the pre-employment medical examination in this factory has changed only in detail in the past 30 years. As in many firms with a medical officer, it consists of a questionnaire about past health, which the man is required to sign, followed by a routine physical examination.

These records were inspected for evidence of both trivial and also more clinically important conditions. The latter were those which could be expected to affect the type of work the man could undertake and included, for example, chronic chest disease, proven peptic ulcers, definite rheumatic heart disease, and disabling orthopaedic conditions.

Neither the trivial nor the clinically significant conditions differed statistically in incidence between the four groups of men studied. The former were recorded in one quarter of the men, and the latter in 5 per cent. One of the never sick group was on the Register of Disabled Persons before he was employed in 1945. He had then, and still has, definite asthma but has never lost a day from work with this or any other condition.

Ten of the men were found to have concealed a clinically significant fact in their history at the pre-employment examination, but these also were equally divided between each group. Thus the pre-employment examination as it had been recorded was of no predictive value in this investigation.

Sickness Absence before and after 1964 The comprehensive records of every spell of sickness absence enabled a number of different methods of analysis to be used. One aspect studied was a search for evidence of a 'sickness absence habit', in other words, the degree of consistency in sickness behaviour over the years as shown by the groups and also by the men themselves.

Since 1964 was the reference year, the mean annual spells per man was calculated for each group from the first year of employment up to the end of 1963. Two years have elapsed since the reference year so this calculation has been done also for 1965 and 1966 combined. The results are shown in Table V and suggest that each group had reasonably consistent mean rates before and after 1964.

TABLE V

GROUP MEAN ANNUAL SPELLS OF SICKNESS ABSENCE PER MAN BEFORE, DURING, AND SINCE 1964

	Mean Spells/Man/Years			
	Frequently Sick	Controls	Long Sick	Never Sick
From first year of employment to 1963	3·46	1·71	1·46	0·12
In 1964	5·57	1·55	2·09	0
In 1965 + 1966 ..	4·39	1·98	1·88	0·16

To find out whether the sickness absence record in the first year of employment was significantly different between the frequently sick, who had a mean of 2·91 spells that year, and their matched controls, who had had 1·36 spells per man, the 't' test was applied for each of the 56 pairs. This difference was highly significant ($t = 36.47$ $P<0.001$).

Although the 't' test compares individuals with their matched controls, there remained to be compared each man's sickness spells in 1964 with his own record in other years. This has been done by calculating coefficients of correlation in both the frequently sick and the control groups. The results are shown in Table VI.

TABLE VI

COEFFICIENTS OF CORRELATION BETWEEN SICKNESS SPELLS IN 1964 AND EACH YEAR BETWEEN 1960 AND 1966

Year compared with 1964	*Frequently Sick*	*Controls*
1960	+0·2	+0·2
1961	+0·6	+0·3
1962	+0·1	+0·7
1963	+0·3	+0·8
1965	+0·3	+0·6
1966	+0·4	+0·3

The observed correlations are variable and not particularly high, even though they are all positive. The low values are due largely to a number of men in each group whose sickness spells differ widely from one year to the next, although most men in each group show reasonable consistency. Thus in 1962, when the correlation in the frequently sick group was only + 0·1, the group as a whole had 3·64 spells per man, whereas the control group had 1·75 spells.

Three examples of annual sickness absence spells over a 10-year period of employment from men in the frequently sick group illustrate this in Table VII; one (case 5) was consistently high, the second (case 19) was intermittently high, whereas the third (case 162) had frequent spells only after 1960.

TABLE VII

THREE EXAMPLES FROM THE FREQUENTLY SICK GROUP WITH CONSISTENT, INTERMITTENT, AND OCCASIONAL YEARS WITH MANY SICKNESS ABSENCE SPELLS

Year	*No. of Spells in Each Year*		
	Case 5	*Case 19*	*Case 162*
1964	6	5	5
1963	5	6	6
1962	5	2	4
1961	6	8	4
1960	7	5	2
1959	5	1	2
1958	4	5	3
1957	6	2	2
1956	5	2	1
1955	4	4	2

One further point deserves mention. Although in any one year about one man in three in the whole population has no spell of sickness, this was extremely uncommon among men in the frequently sick group, and although the correlations were low, only five of the 27 men with 10 years' continuous service ever had a single year without a sickness spell.

The long sick group, on the other hand, showed no such consistency and, with a few exceptions, their sickness absence before and after 1964 resembled that of the control group and of the whole population. It appears from their age distribution, occupations, and sickness absence that most of them could be considered as a reasonable sample of the whole population. Further evidence on this aspect of the long sick group will be presented in a later paper.

Diagnoses of the Sickness Spells in 1964 Although the men in the frequently sick group had nearly three times as many spells of sickness absence as their matched controls during the reference year, there was little difference in the types of illness. Upper respiratory tract diseases, including influenza, caused 20% of all spells in each group; gastro-enteritis was the next most common (19%), and musculo-skeletal conditions were third (11%). Only neurotic conditions showed any significant difference between the two groups, causing 5·5% of the total spells among the frequently sick and 1·1% of those in the controls, a difference significant at the 0·05 level.

When the number of men having spells in each disease category was analysed, however, the frequently sick outnumbered the controls for every diagnosis (Table VIII).

TABLE VIII

MEN IN FREQUENTLY SICK AND CONTROL GROUPS HAVING SPELLS OF SICKNESS ABSENCE IN 1964 IN BROAD DISEASE GROUPS

Diagnosis	*Frequently Sick*		*Controls*	
	No. of Men	*Proportion of 56 (%)*	*No. of Men*	*Proportion of 56 (%)*
Upper respiratory tract diseases, including 'flu	44	78·5	21	37·6
Gastro-enteritis	32	57·2	14	25·0
Musculo-skeletal disorders	23	41·2	7	12·5
Gastritis and dyspepsia..	17	30·4	7	12·5
Neuroses	12	21·4	1	1·8
Ill-defined	12	21·4	4	7·2
Non-occupational injuries	10	17·9	2	3·6
Bronchitis	8	14·3	7	12·5
Migraine	5	8·9	1	1·8
Sepsis	5	8·9	1	1·8
Occupational injuries ..	4	7·2	1	1·8
Other conditions ..	19	34·0	7	12·5

A comparison of the proportion of men in each group who had spells of each type of disease

shows that the differences were highly significant ($P<0.003$) for upper respiratory tract diseases, gastro-enteritis, musculo-skeletal disorders, and neuroses; and significant at the 0·05 level for gastritis, non-occupational injuries, and ill-defined conditions. Only for bronchitis are the groups closely similar.

Thus the frequently sick group had more spells of all the usual diseases affecting the controls, and, with the single exception of neuroses, they were not especially susceptible to any one type of sickness.

The illnesses of the long sick group, however, were of quite a different pattern. The commonest diagnostic group was bronchitis and asthma, which caused 23% of all spells; musculo-skeletal conditions caused 19% and upper respiratory tract diseases came third with 12% of spells. The order of duration of absence, however, was different again. Six spells from cardiovascular disease caused 780 days away, 12 spells from musculo-skeletal conditions caused 723 days away, and the 17 spells from bronchitis and asthma came third with 394 days.

Occupational Injuries The number of such injuries reported by men in each group differed considerably both in 1964 and in earlier years. The frequently sick had had more injuries than the controls, who in turn had reported more than the long sick and never sick groups. In all the men who had been employed for the five years 1960-64, the correlation coefficient between total spells of sickness and total number of injuries was + 0·4. It should be emphasized that almost all these injuries were minor and thus ascertainment depends largely upon the tendency of the man to report.

Occupational History and Factors relating to the Job The frequency of changing jobs before joining the company was compared but no significant differences were found between the frequently sick and control groups. This is because many of the maintenance workers had previously been employed by engineering contractors who usually take on labour for each separate contract.

Job Satisfaction The attitude of the man towards his job proved to be of considerable importance. This was assessed both directly, by inviting his opinion of the job as such, and indirectly, by asking whether he wanted more responsibility and whether he would like a change of foreman. The results of these questions are presented in Tables IX and X.

In this direct assessment of job satisfaction, definite enjoyment of the job was very significantly less common ($P<0.003$) in the frequently sick than in the control group. The never sick were almost unanimous in saying that they definitely enjoyed their job. At the other extreme of opinion, only the frequently sick had a significant number of men admitting that they disliked their job ($P<0.05$).

TABLE IX

OPINIONS EXPRESSED ABOUT THE JOB

Group	*Definitely Enjoy*		*Indifferent*		*Dislike Job*	
	No.	%	*No.*	%	*No.*	%
Frequently sick..	26	46	20	36	10	18
Controls.. ..	45	80	9	16	2	4
Long sick ..	26	74	7	20	2	6
Never sick ..	45	96	1	2	1	2
All men	142	72	37	20	15	8

TABLE X

THE DESIRE FOR MORE RESPONSIBILITY

Group	*Actively Want*		*Would Accept*		*Do not Want*	
	No.	%	*No.*	%	*No.*	%
Frequently sick..	35	62	2	4	19	34
Controls.. ..	17	30	14	25	25	45
Long sick ..	10	29	4	11	21	60
Never sick ..	5	11	10	21	32	68
All men	67	35	30	15	97	50

An active desire for more responsibility was found in a very significantly greater proportion ($P<0.003$) of the frequently sick than in the control group. Few of the never sick felt this way. The intermediate answer—that he would accept more responsibility if it was offered—tended to be less common in both groups with high sickness.

The other indirect measure of job satisfaction was provided by a question about wanting a change of foreman. The only group with a significant proportion (20%) wanting such a change was the frequently sick.

The Journey to Work There was no significant difference between the groups in the time taken to travel to work; three-quarters of each group took less than half an hour. The method of transport, however, proved to be of some interest. Over half the men came to work in their own car, but only 28% of the never sick did so. This was not because they came in other men's cars but because many more of them (40%) cycled to work. When one

recalls that these men were older and more highly paid than those in the other groups, and most of them were shift workers, this observation becomes even more remarkable.

Performance Ratings There was no firm relationship between the supervisor's assessment of work performance and sickness behaviour. Furthermore, some men who said they liked their jobs were given bad reports, and, of the 10 frequently sick who said that they disliked their jobs, four were rated as 'above average', five as 'average', and only one as 'bad'.

Social Background and Present Home Circumstances

Family Background Men born or brought up in the neighbourhood of the factory with relatives living in the same area formed rather more than half the total and were evenly distributed between the four groups. Social class, based on the father's occupation, and also family size, in number of siblings, showed no difference between the groups.

The attitudes of the men about their own childhood, however, revealed marked differences. Each man was asked whether he now considered that his own childhood had been very happy and secure, quite happy, or unhappy. Their answers are shown in Table XI.

TABLE XI

GROUP ATTITUDES TOWARDS THEIR OWN CHILDHOOD

Group	*Very Happy*		*Quite Happy*		*Unhappy*	
	No.	%	No.	%	No.	%
Frequently sick..	28	50	15	27	13	23
Controls.. ..	42	75	9	16	5	9
Long sick ..	24	69	3	8	8	23
Never sick ..	41	87	5	11	1	2
All men	135	70	32	16	27	14

The frequently sick and controls differed in both the 'very happy' and 'unhappy' answers to a significant degree ($P<0.05$), as did the long and never sick groups. An unhappy childhood was claimed by almost one quarter of both the frequently and the long sick groups. The incidence of a broken parental marriage was low for all, but the long sick (14%) and the frequently sick (7%) had higher rates than the never sick (2%) and controls (4%). If these two pairs of groups are combined, the difference becomes significant at the 0·05 level.

Present Social Conditions Almost all the men in the survey were married and only seven had been divorced, three in the never sick group, two in the long sick, and two in the control group. Housing conditions were similar for all with almost half the men living as owner occupiers. Illness of a wife or child in 1964 was uncommon and showed no difference between the groups.

The number of dependent relatives was counted for each man, excluding wives or children in full-time employment. The mean number of such dependants and the proportions of men with none, a few or several were very similar for each group. The mean number of sick spells in 1964 for each man with 0, 1, 2, 3, and 4 or more dependants was calculated for all the men in the survey. This showed that men with one dependant had only 1·5 spells in the year whereas men with none and more than one had about 2·7 spells each.

Other Work Second jobs, either as self-employed or 'helping out friends', were admitted to by 16 men in all—10 from the frequently sick group (18%), four from the never sick group (9%), and two from the long sick group (6%), but none of the controls. This difference between the frequently sick and their matched controls is highly significant ($P<0.003$). The number of such men among the never sick group could be misleading until one recalls from results already presented that this group did little overtime. The men who did a mean weekly overtime of at least 10 hours and also a second job came only from the frequently sick group.

Voluntary work, on the other hand, showed no association with sickness even when overtime was taken into account.

Family Medical History One factor in which the groups differed was the loss of a parent by death before the age of 60 years. These men, expressed as a proportion of those whose parents had, or could have, reached that age, amounted to 42% of the frequently sick group and 20% of the controls, a difference significant at the 0·05 level, but the other two groups came between these two extremes. The incidence of parental bereavement in childhood was higher in the frequently sick group but did not differ significantly from that in the other groups.

Past Medical History As with the pre-employment medical records, most of the factors investigated in this section of the survey were more notable for their similarity than for their differences.

Previous hospital admissions were divided into those as a child (under 16 years), which did not differ between the four groups, and admission as an

adult. In this latter category only the long (86%) and never sick (26%) groups differed significantly since both the frequently sick and control groups were similar with 46 and 43% respectively.

Three other points, however, showed significant differences—the incidence of a 'nervous breakdown', proven peptic ulceration, and one or more episodes of loss of working time due to back pain. The numbers and proportions of men in each group with these facts in their past history are shown in Table XII.

TABLE XII

INCIDENCE IN PAST HISTORY OF 'NERVOUS BREAKDOWN', PEPTIC ULCERATION, AND INCAPACITATING BACK PAIN

Group	*Nervous Breakdown*		*Peptic Ulcer*		*Incapacitating Back Pain*	
	No.	%	*No.*	%	*No.*	%
Frequently sick..	11	20	3	5	32	57
Controls.. ..	3	5	0	0	18	32
Long sick ..	6	17	7	20	18	53
Never sick ..	1	2	0	0	6	13
All men	21	11	10	5	74	38

All three conditions were more common ($P<0.05$) among both the frequently and long sick groups than in the control or never sick groups. However, although a past history of a peptic ulcer confirmed by barium meal was most common in the long sick group (although only four of the 35 men were absent with the diagnosis in 1964), the other two conditions were most prevalent in the frequently sick group.

Present Medical Symptoms Here, too, most of the factors studied occurred in similar proportions in each group. Despite the findings regarding peptic ulceration and incapacitating back pain in the past history, indigestion and muscle or joint pains were remarkable for their closely similar prevalence—about 40% in each of the four groups.

Only in the proportions of men who stated that they had four or more upper respiratory tract infections each year, that they had a cough all day (M.R.C. grade II), and that they were troubled by constipation, did the groups differ to a significant degree (Table XIII).

The finding of more frequent upper respiratory tract infections and persistent coughs in the frequently sick and long sick groups might have been expected. However, the significant difference between the proportions affirming that they were troubled by constipation in these two groups when compared with the control and never sick groups ($P<0.05$) came as a surprise.

TABLE XIII

INCIDENCE OF MEN ADMITTING TO AT LEAST FOUR EPISODES OF U.R.I. ANNUALLY, ALL-DAY COUGH, AND TROUBLESOME CONSTIPATION

Group	*4+ U.R.I. per year*		*All-Day Cough*		*Troublesome Constipation*	
	No.	%	*No.*	%	*No.*	%
Frequently sick..	11	20	7	13	16	29
Controls	2	4	3	5	6	11
Long sick ..	1	3	7	20	13	37
Never sick ..	3	6	1	2	6	13
All men	17	9	18	9	41	21

Although the proportions with an all-day cough differed significantly, those with sputum, although suggestive, were not significant. The long sick group was most affected, and in 1964 nine of the 35 men had been absent with a diagnosis of asthma or bronchitis.

It is relevant to note the smoking histories at this point. Similar proportions of each group were non-smokers and ex-smokers. The only significant difference found was that 35% of the frequently sick and 14% of controls smoked more than 14 g. of cigarette tobacco daily.

Physical Examination The standardized examination did not show many significant differences between the groups although limitation of the range of movements of both cervical and lumbar spines was found more commonly among the long and the frequently sick ($P<0.05$).

Poor dental hygiene, which was easily visible on inspection of the mouth with a torch and spatula only, showed a suggestive trend, being found in 29% of the frequently sick and 43% of controls, and in 24% of the long sick and 41% of the never sick. It appears that men with more sickness absence tend to take more care of their teeth.

Finger nails were inspected for evidence of nail biting. A number of men explained that since being fitted with dentures they had been unable to continue the habit. The number in each group showing definite evidence of nail biting expressed as a proportion of those with their own front teeth was very similar in the frequently sick, control, and long sick groups, amounting to 19% for the three groups combined, but for the never sick the

proportion was higher (28%), an interesting though not statistically significant difference.

Any idea that the never sick group might consist of exceptionally fit men was soon disproved. Thirteen of them (28%) were found to have abnormalities, a proportion similar to that found in the frequently sick and control groups. The conditions found among them included a case of previously undiagnosed diabetes, two cases of chronic bronchitis and one with long-standing asthma, two with gross kyphoscoliosis, and one case of mild Parkinson's disease. Others in this group included two men with cranial nerve palsies and one man each with a mixed parotid tumour, a hydrocoele, a spermatocoele, and finally a man with severe pes planus and hallux rigidus.

Special Investigations Lung function tests of vital capacity and forced expiratory volume confirmed the physical signs, and, as expected, the long sick group had the highest proportion of men with a significant reduction in function. Apart from this, no important differences were found between the groups when age, height, and smoking history were taken into account. Regression curves have been calculated for $F.E.V._{\cdot 1 \cdot 0}$ on age and height for the frequently sick and control groups but showed no appreciable difference between them. Similar results were obtained from the chest radiographs.

The Eysenck Personality Inventory Both test papers were used and the mean scores for each group are shown in Table XIV. The normal values and their standard deviations (Eysenck and Eysenck, 1964) are also included in the Table.

These results suggest that the never sick are characterized by introversion and stability, the long sick by introversion and neuroticism, and the frequently sick by a degree of extroversion and a higher neuroticism score than the controls. The high lie score of the never sick is of some interest and will be discussed later.

These results suggested that it might be of value to estimate the relation of these scores to other factors already shown to be associated with sickness absence in this survey. To avoid errors due to a single year's experience the figures for the 149 men out of those seen who had been continuously employed for five years were used, and the correlation coefficients are presented in Table XV.

TABLE XIV

RESULTS OF EYSENCK PERSONALITY INVENTORY (PAPERS A PLUS B)

Group	*Extroversion Score*	*Neuroticism Score*	*Lie Score*
Frequently sick ..	27·6	19·1	5·3
Controls	26·3	15·4	5·1
Long sick.. ..	23·4	22·5	5·1
Never sick ..	23·9	12·2	7·0
Normal values ..	26·2±7·8	19·6±9·0	3·6±2·5

All the five variables correlate with extroversion and, except for lateness, all are over + 0·2. This level, although low, is comparable with other published results. The usual tests of significance cannot be applied since none of these variables is normally distributed. Neuroticism correlates less well and is negligible with occupational injuries and other absences. The lie score has a negative correlation with all variables in the same order of magnitude as the neuroticism score.

Discussion

This type of survey imposes a number of limitations which should be considered before attempting to interpret the results.

The risk of becoming ill can never be equal for all men since, apart from variations in the external influence or stimulus there are also differences in individual susceptibility. The difficulty is increased because this survey is not about sickness, but rather absence from work certified as due to medical incapacity. Spells of absence arise because the man reports the condition and hence there are always unknown errors in ascertainment. All doctors have

TABLE XV

CORRELATIONS BETWEEN PERSONALITY INDEX SCORES AND EACH MAN'S TOTAL SPELLS OF SICKNESS, OCCUPATIONAL INJURIES, TREATMENT ROOM ATTENDANCES, LATENESS AND OTHER ABSENCE FOR 1960-64 INCLUSIVE (149 MEN)

Personality Scale	*Sickness*	*Injury*	*Treatment Attendances*	*Lateness*	*Other Absences*	*Mean Score*
Extroversion	+0·22	+0·23	+0·26	+0·15	+0·23	25·12
Neuroticism	+0·17	−0·06	+0·11	+0·17	+0·07	16·46
Lie score	−0·15	−0·14	−0·16	−0·19	−0·00	5·83

experienced some patients who demand sickness certificates for trivial conditions whereas others refuse to take time off work for quite serious illness.

Furthermore, any results of this survey can be taken as valid only for the refinery population from which they were obtained, and without further similar studies must not be inferred to other working populations. This is illustrated by the attempt of Castle (1956) to confirm an observation by Hill and Trist (1962) that able-bodied absenteeism was an acceptable mode of behaviour. The observation had been made in a steel foundry in the Midlands, and Castle found that this type of behaviour was not acceptable among workers in a photographic factory near London where it was replaced by 'sickness'.

Sickness Absence Liability and Resistance The evidence from this survey suggests that the groups did show a consistent tendency to continue with high, average or low frequencies of sickness spells. Among individual men, however, the correlations do not follow the criteria laid down for 'accident proneness' by Cresswell and Froggatt (1963) as they are neither stable nor independent of the length of interval between the periods studied. Nevertheless, few of the frequently sick men ever had a single year without a spell of sickness, although one third of the factory population had no spells each year.

It seems reasonable to conclude that personal liability to sickness absence does exist and that, although for most men this is only prominent for a few years at a time and can be dramatically affected by a change of job (Taylor, 1967a), it sometimes recurs, and for a few it appears to be relatively stable. The phenomenon of sickness absence resistance has seldom been investigated, although it was observed in the work of Hinkle, Plummer, and Whitney (1961) and also by Kessel and Shepherd (1965) in their survey of a London suburban practice in which 3% of the population had not consulted a doctor for 10 years. The evidence from the present survey suggests that the never sick group is more homogeneous than any of the other three groups.

Factors Related to Sickness Absence Most of the factors found to be significantly associated with sickness absence can be considered as behavioural rather than medical, environmental or economic. The strong associations with other forms of absence and lateness are not surprising and have already been observed by social scientists such as Behrend (1951) in her study of industrial absenteeism. The very low rate of such absences among the never sick provides confirmatory evidence not previously reported.

The failure to show a significant association between sickness absence and overtime, despite suggestive trends, was also noted by Lokander (1962). Nevertheless the combination of a high level of overtime and a second job was significant.

Before assessing the results of the interview and personality inventory one should consider the validity and reliability of the answers. Although it is certainly possible that many of the men may have deliberately lied, the voluntary nature of the interview and the explanation given to each man, together with the assurance of confidentiality, make such a suggestion unlikely to be true.

Vernon (1964) has considered the problem at some length and stated, 'The ordinary man who is not highly educated is stereotyped, intolerant, self satisfied, non-psychologically minded, and rejects any imputation of psychological weaknesses: whereas the better educated man takes a more detached view of himself and is more aware of his conflicts and anxieties.' Only 17 men in the survey had had any secondary education and all of these had left school at the age of 16; thus the men seen could be described as 'ordinary' in this context. It is essential to appreciate that the answers should be taken as a sample of the person's self-concept and memory and not necessarily entirely true in an objective sense.

The reliability of the answers could have been tested by repeating the questions after a lapse of time, but this was impracticable. However, work on personality tests has shown a high degree of reliability in retests (Vernon, 1964; Eysenck and Eysenck, 1964) and it seems reasonable to assume that this would be true for this survey.

In the results, the attitudes of the man towards himself, his work, and his own health appeared to be the most important factors of all. As Chiesman (1957) expressed it, 'Staying away from work or return to work does not depend upon the start and cessation of a particular disease process, but on the standard of health which the patient sets himself or, in other words, on his ability to adjust himself to his working environment.'

In the medical history the most important associations with sickness absence were a history of previous neurotic illness, peptic ulceration, and loss of work from back pain. The present symptoms of importance were frequent upper respiratory tract infections, a persistent cough, and being troubled by constipation. Alcoholism, found to be of great importance by Lokander (1962), was not significant in this survey, but the isolation of the

refinery and the strictly enforced rule that no alcohol is allowed inside the gates would ensure that alcoholics selected themselves away from working there.

The never sick group turned out to be the most interesting one. Almost without exception they denied that there was anything wrong with their health, their home or their work. The three who refused to take part in the survey did so politely but firmly, and all stated that since there was nothing wrong with their health there could be no point in any medical examination. It is suggested that they may have been afraid of what an examination might have revealed. It is interesting that Kessel and Shepherd (1965), in their survey of a general practice, failed to achieve an interview with as many as 30% of the 10-year non-attenders.

The high lie score in the personality inventory among the never sick should be considered. Gibson (1962) stated that a high score could arise from either deliberate faking, a response in terms of an ideal self concept, or an honest lack of insight. In view of the atmosphere of the interview and the men's apparently frank response to other questions the honest lack of insight or an ideal self concept would appear to be the reason for the high lie score in this group.

The higher extroversion score found in the frequently sick group confirms several studies by industrial psychologists who have shown that this tends to be associated with various forms of withdrawal from the work situation (Cooper and Payne, 1967) and with delinquency (Eysenck, 1964). Eysenck's hypothesis implies that extroverts condition poorly and therefore find it more difficult to settle in regular routine jobs whereas introverts condition more readily. The higher neuroticism score in the long sick group may well be secondary to the long-term sickness absence that these men had experienced the year before; prospective studies should be made to confirm or refute this suggestion.

Job Satisfaction—Association or Causation

Although a number of factors were found to be associated with sickness absence, few could fulfill the nine criteria listed by Hill (1965) which should be considered before they can be proposed as causative. These criteria were strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, and analogy.

Job satisfaction, assessed directly or indirectly, does fit several of these tests. The association has strength and is reasonably consistent; specificity has been suggested by other work in the study of absenteeism; temporality and a biological gradient can be seen; it is plausible and coherent. Experiment in the sense of change in supervision or change in job has been achieved in isolated cases (Taylor, 1967a).

Both age and occupation might be associated with job satisfaction as well as with sickness behaviour and could thus influence the results. Since the number of men involved is small it was only possible to measure the effect of age by comparing men under and over the age of 40 years. The proportions with a desire for more responsibility, liking the job, and wanting a change of foreman in the frequently sick and never sick groups were still significantly different in both younger ($P<0.05$) and older ($P<0.003$) men. The effect of occupation was allowed for in the selection of the control group, but a second control group would have been advisable for the never sick had time and resources allowed.

Clearly more work is required to clarify this problem. Do the men whose sickness record improves dramatically after a change continue to give a high extroversion score? The observation that three-cycle, continuous shift workers have significantly less sickness absence than day workers of similar age in similar jobs (Taylor, 1967b) suggests that the self-disciplined job is more satisfying than the job in which discipline is imposed.

The findings in this paper also have important implications for industrial management. A number of the men seen admitted that they would like to change their job but the non-transferable pension and the 'good money' they receive made them unwilling to move. Older men with dependants could not afford to move. The increasing development of automation will inevitably impose change on the present pattern of jobs in this country. Enforced alteration of jobs should not be made at the cost of increased absenteeism attributed to sickness.

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